



Study of Dental Fluorosis in Village Botony (Line Pod) Taluka Maregaon and Skeletal Fluorosis in Village Mangi Kolam Pod and Darna Taluka Pandharkawda, District Yavatmal, Maharashtra.

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ABSTRACT

Fluoride is among the most prominent contaminants affecting the suitability of groundwater for drinking in many states of India including Maharashtra. Occurrence of fluoride in groundwater has drawn significant attention in recent years because of its known toxicity and increasing severity in the fluoride affected areas. A large number of efforts by researchers, various government agencies and NGOs have been put and huge money has been also spent in tackling fluoride menace in Yavatmal district, but it is unfortunate that the fluoride problem has not given any relief. In this paper an attempt has been made to study water fluorosis in Botoni (Line pod) and Mangi kolam pod and Darna a place known for its severe fluoride contamination. The area is mainly occupied by Deccan Basaltic Rocks which is proved to be the main source of Fluoride in the above mentioned villages.

Keywords; Deccan basalts, groundwater, fluoride, contamination, rocks, toxicity, menace

INTRODUCTION:-

Excessive ingestion of fluoride during the early childhood years may damage the tooth forming cells leading to a defect in the enamel known as dental fluorosis. The first case of fluorosis was detected from Andhra Pradesh, Nalgonda during early 1930s. (H.E short et. Al 1937) Previously drinking water containing less than 1 ppm of fluoride content causes tooth decay. Such deficiency in fluoride content can be made up by brushing the teeth with toothpaste containing fluoride. The toothpaste contains fluoride in form of stannous fluoride. The tooth enamel is composed of $Ca_5(OH)(PO_4)_3$ which slowly converts to $Ca_5F(PO_4)_3$ due to regular brushing of teeth with fluoride tooth paste. It also resists the attack of germs and mild organic acids associated with foodstuff and prevent tooth decay. If the percentage of fluoride increases as per as standard 1.4 ppm, these are becoming major problem among the health by fluorosis.

Scientifically three types of fluorosis are seen which are dental fluorosis, skeletal fluorosis and non skeletal fluorosis. Non skeletal fluorosis also known as manifestation affects to the nervous system, muscles, urinary tract etc. The maximum amount of fluoride during childhood causes a defect in tooth called Dental fluorosis and in bones and joints is called as skeletal fluorosis. Teeth impacted by fluorosis have visible discoloration, ranging from white spots to yellow, brown and black stains. Teeth with fluorosis also have an increase porosity of the enamel. In the milder forms, the porosity is mostly limited to the sub surface enamel, where as In the more advanced forms, the porosity impacts the surface enamel as well, resulting in extensive pitting,

chipping, fracturing and decay of the teeth. The discoloration induced by fluorosis- particularly in its advanced forms, can cause significant embarrassment and stress to the impacted child, resulting in advanced effect on esteem, emotional health and carrier success.

Maximum toxicity of the fluoride is determined due to underground water, which is use for drinking purpose affected as fluorosis. In the village Botoni (Line Pod) Taluka Maregaon District Yavatmal one of the affected place of fluoride. Prominent symptoms of dental fluorosis seems among the children in Botoni Line pod while prominent symptoms of skeletal fluorosis is seen in Mangi kolam pod and darna, district yavatmal.

Location of Village :-

The Botoni village is located on Yavatmal-Wani road about 65 km away and Mangi kolam pod is located on Yavatmal-pandharkawda road about 88 km from Yavatmal district place. Village is situated in survey of India Topo sheet No. 55L/ Population of village is 150 with twenty houses.

Physiography and Drainage :-

The village is located on topographic high area with gentle slope towards north. A small streamlet located about 100mts distance North. The nalla is seasonal. The altitude of village 290 mt about mean sea level.

Rainfall and Climate :-

The rainfall is unevenly distributed in the district. The average rainfall varied rainfall varied from 330 mm To 970 mm. almost all the precipitation the months of June to September.

The Climate is divided into four seasons. The cold season prevails from December to February followed by the hot season from March

to the diurnal temperature ranges from a minimum 8° C in winter (January) to maximum of 44° C in (May).

Geology and Hydrogeology :-

The village is covered with hard and compact massive basalt. The sub surface geology as follows.

Table No. 1 Geological Data

Sr. No.	Rock Type	Depth in mts
1	Solid and weathered basalt	0-2
2	Hard impervious basaltic lava flow	2-30
3	Vesicular basaltic rock	30-60

{Geological data source from office of the Senior Geologist, G.S.D.A. Yavatmal}

Hydro geochemical survey of the study area has been carried out during the pre-monsoon of 2015 and comparative study was done which showed that comparison of F concentration of ground waters between shallow aquifers (depth less than 20 m) and deeper aquifers (depth more than 40 mt) from the surrounding area has indicated that deeper aquifers have higher Fl concentration than

the shallow aquifers by Wodeyar, B.K. and Srinivasan. G 1996., Prembabu et. al 2004 and Bhaskar, K. G. 2004.

Material and Methods :-

The water samples were collected from the hand pumps in the village and stored in the polythene bottles thereafter, brought to the laboratory for further chemical analysis. The chemical analysis of water was carried out at Amolakchand Mahavidyalaya, Yavatmal.

Table No. 2 Chemical Analysis Data

Sr. No.	Village	pH	Con	Alk	TDS	Hardness	CI	So4	No3	Ca	Fl	Fe
1	Botoni Line pod	7.8	-	220	340	-	30	12	1	-	2.3	0.45
2	Mangi kolam pod	8.2	590	92	387	136	42	19	2	27	8.2	0.10
3	Darna	7.9		210	393	210	45	22	0.05	24	2.9	0.23

Analysis carried out at Public health lab Yavatmal, State Maharashtra, India as well as amolakchand mahavidyalaya, Yavatmal and reports were compared with Analysis reports by National Environmental Engineering Research Institute, Nagpur, State Maharashtra, India. (2002)

DATA DISCUSSION :-

- 1) pH-Ranges from 7.8 to 8.2 showing alkalinenature.
- 2) Alkalinity- Alkalinity ranges from 92 to 220ppm.
- 3) Conductivity – Conductivity is 590ppm.
- 4) Total dissolved solids – Ranges from 300 to 400ppm.
- 5) Hardness – Hardness is 136 to 210ppm.
- 6) Calcium – Calcium ranges from 20 to 30ppm.
- 7) Fluoride - Fluoride ranges from 1.9 to 2.3ppm but severely recorded as 8.2 in Darna.
- 8) Iron – Iron ranges from 0.1 to 0.45ppm.
- 9) Chloride – Chloride ranges from 30 to 45ppm.
- 10) Sulphate – Sulphate ranges from 12 to 22ppm.
- 11) Nitrate – Nitrate ranges from 1 to 2ppm.

Result and Discussion :-

pH is a term used universally to express intensity of acid of alkaline condition of solution. It determines the equilibrium between carbonates and bicarbonates. The pH value above permissible limit may affect mucous membrane bringing health related problem. The pH of textile

water effluent in present study was 7.5 **Conductivity** is a measure of water capacity to convey electric current. EC of the present study sample was measured 590 (more than TDS) It is an important guideline to check purity of water. The high conductivity valueare harmful for plant growth. **Alkalinity** is a measure of its capacity to neutralize acids. It is mainly due to salts of carbonates. The value of alkalinity ranged from 35.06 to 25.32 mg/lit very low than ISS normal value. **Hardness** is the property of water which increases its boiling point and prevents lather formation. It is directly proportional to the amount of calcium and magnesium present in the water. The hardness of textile industry water outlet was quite high with all the five sites having same value. The water contains hardness with mean value of 223 mg/lit. **Chloride** is the major inorganic anion present in waste water. Usually it is present in very low concentration because high concentration of chloride brings salty undesirable taste to drinking water. Its BIS limit is 250 mg/lit and chloride content in sample studied was found to be 30 to 42 ppm. **TDS** are the residue left in the

water after it has been dried to constant weight at 103c in a pre-weighted beaker. It is an index of solid present in dissolved form. TDS composes mainly of inorganic salt and small amount of organic matter. The mean **TDS** value found in present study was 300 to 400.

Simply finding water fluoridation may be sufficient to cause changes in bone remodeling at this age is worrying and hence proper attention and research work is needed. Because dental fluoridation ignores all effects of fluoride except on teeth but effect of skeletal fluorosis cannot be dismissed as non-existent.

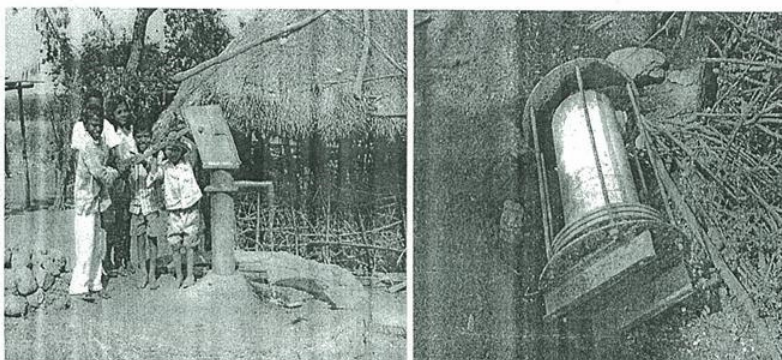
PHOTOGRAPH SHOWING DENTAL FLUOROSIS



Age:- 13yrs

Age:- 10 yrs

PHOTOGRAPH SHOWING LOCATION OF VILLAGE WITH HAND PUMP AND DEFLOURODATION UNIT



*Children with hand pump
Of fluoride rich water*

*Defluorenation unit
removed from hand pump*

Fluoride Removal Technique :-

For the precautional measures, government has installed fluoride removal unit i.e. Iron exchange unit on the hand pump where alum is used in the unit. The replacement of alum after one week is necessary. This village could not maintain the procedure. Secondly the water flows through ion exchange unit had slow delivery. Due to this factor and lack o awareness among the people they completely removed the instrument i.e. ion exchange unit. The present condition of the instrument is seen in photographs.

Remarks and recommendations:-

➤ The only one hand pump is located in village used for drinking water purpose.

- The chemical analysis report shown that occurrence of fluoride is more than permissible limit.
- The chemical quality of water is not suitable for drinking water purpose.
- The dental fluorosis and skeletal fluorosis is observed in villagers, especially among children.
- Enamel of teeth gets removed due to consumption of fluoride rich water and bones have become brittle very easy to get factured.
- The colour of teeth becomes yellowish.
- Prominent effect of flurosis is seen on incisors and canines.
- No skeletal flurosis observed in Botoni village while dental fluorosis is not observed in Mangi kolam pod as well as Darna.

- Due to hard rock, no other sources except hand pump having deeper ground water.
- No panchayat dug well in gaothan.
- Basaltic rock containing fluoride, no dilution of fluoride in bore well.
- Rain water harvesting is good source for dilution of ground water.
- For the immediate measures government should supply tanker water for drinking purpose and villagers should use hand pump water for domestic purpose.
- The existing water supply scheme of Botoni village is recommended for extension up to the line pod.
- Calcium rich fruits and milk is recommended for fluorosis, but they cannot afford due to poverty.
- Due to less population problems can be solved easily but illiteracy among the people ignores their health.

CONCLUSION :

We conclude that basaltic rock is the source of fluoride at Botoni (Line pod) and at dama as well as Mangi kolam pod. (Saxena, V. K. and Ahamed, S. 2001). High concentration of fluoride in deeper aquifers compared to shallow aquifers could be due to its high residence time in the aquifers system, thereby having longer contact time for dissolution of fluoride bearing mineral present (Ramkrishnan, S 1998). We conclude that very high ppm of fluorosis has resulted severe drastic skeletal fluorosis resulting into brittleness of bones and damage to bones and joints particularly in young children's by increasing level of fluoride. Due to this bone is hardened with less elasticity resulting into increased frequency of fractures. Fluorosis in terms of chemistry is only excess of fluoride ions but in terms of biology it brings very serious and drastic ill effects including physical as well as mental and social health.

Fluoride is a double edged weapon. If properly utilized benefits occur while uncontrolled and improperly handled it can be a health hazard. In the village selected maximum toxicity of the fluoride is determined due to underground water

having concentration more than permissible limit i.e. 1.5 ppm which is used for drinking purpose. Health future of the children under fifteen years in Botoni (Line Pod) is affected by dental fluorosis. The drinking water problem of the villages can be completely solved due to its very less population and we can achieve 100% health success.

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